

# Solar retinopathy following religious rituals

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**SUMMARY** Four cases of solar retinopathy due to sun gazing during religious rituals are reported. All four patients suffered irreversible visual loss.

In ancient times, Plato recorded Socrates's admonishment to avoid eclipse watching, yet it continues to be the major cause of solar retinopathy. We present a series of four patients who during religious rituals gazed at the sun for varying periods of time in an effort to witness an apparition. The purpose of this paper is to draw attention to the severity and permanent sequelae of solar retinopathy.

## Case reports

### CASE 1

A 58-year-old man presented to the Royal Victoria Eye and Ear Hospital in October 1985. He complained of blurred vision affecting both eyes and inability to read print directly in front of him. The onset of symptoms was a week prior to presentation. While praying at a statue of Our Lady in Monasterevin, Co. Kildare, he had gazed at the sun for approximately six minutes in an effort to see an apparition. It was a weak October sky and he was wearing untinted lenses. While he was staring at the sun it turned black, but he could still see the edges. He looked away, the black spots persisted, and his vision was blurred.

On initial examination the corrected visual acuity was 6/18 in the right eye and 6/12 in the left eye. Slit-lamp examination gave normal results. Funduscopy revealed a yellow lesion at both foveas, surrounded by a circular red area (Figs. 1A, B).

When seen in February 1987, 16 months after the initial injury, he still complained of poor visual acuity, glare, and spots in front of both eyes. Corrected visual acuity was 6/12 in both eyes. Funduscopy revealed that the yellow lesion had disappeared and was replaced by a diffused pigmentary change in the perifoveal area. At the centre of

each fovea there was a central 'hole-like' lesion (Figs. 2A, B).

### CASE 2

A 39-year-old man presented to the RVEE Hospital, in October 1986. He complained of blurred vision and black spots in front of his left eye. He had recently returned from a pilgrimage to Medjugorje, Yugoslavia. On 30 September in the late afternoon he had stared at the sun and had seen a vision. The following day he stared at the sun hoping to see the vision again. In an effort to do so he stared at the sun for 45 minutes. While staring at the sun he noticed a black spot, and when he looked away the black spot persisted. His vision was extremely blurred and worsened over the next day. He was unable to recognise people, but over the next week his vision improved.

On examination the best corrected visual acuity in the right eye was counting fingers and in the left eye was 6/9. The right eye had been divergent and amblyopic since childhood. The findings on slit-lamp examination were normal. Colour vision and Goldmann fields were normal. Funduscopy revealed a yellow lesion at the left fovea. This was surrounded by a red circular area. The right fundus was normal. Fluorescein angiography gave normal results.

On review in July 1987 he still complained of a black spot in front of his left eye. His visual acuity had returned to 6/5. Amsler grid testing confirmed the presence of a small central scotoma. Funduscopy revealed a pigmentary disturbance at the left fovea, with a honeycomb pattern.

### CASE 3

A 23-year-old nurse presented to the RVEE Hospital in June 1987. She complained of blurred vision and persistent black spots in the central field of vision of both eyes.

The onset of her symptoms was five days prior to

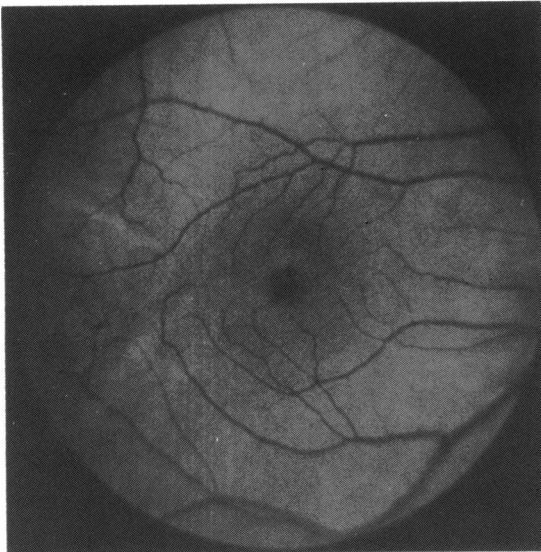


Fig. 1A

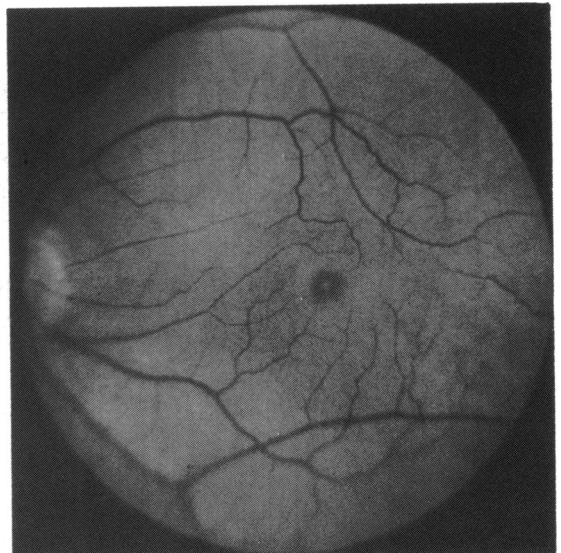


Fig. 1B

**Fig. 1** (A, right eye; B, left eye): *Acute stage of solar retinopathy showing yellow lesion at both foveas, surrounded by a circular area.*

presentation. She had no previous ophthalmic history. While on a pilgrimage to Medjugorje she had stared at the sun for 10 minutes in the late afternoon of a hot summer's day. While staring at the sun it went a deep green, surrounded by a gold rim, and when she looked away her vision was blurred.

On initial examination the patient's visual acuity was 6/9 in both eyes. Amsler grid testing revealed bilateral central scotomata. Colour vision, pupils, and Goldmann fields were normal. Funduscopy revealed a yellow foveolar lesion and macular oedema in both eyes.

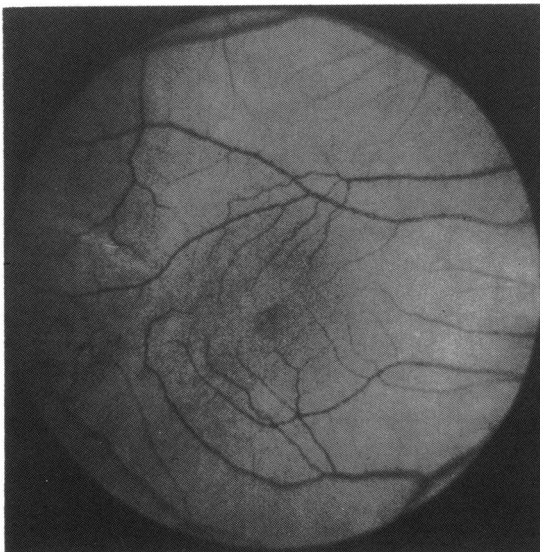


Fig. 2A

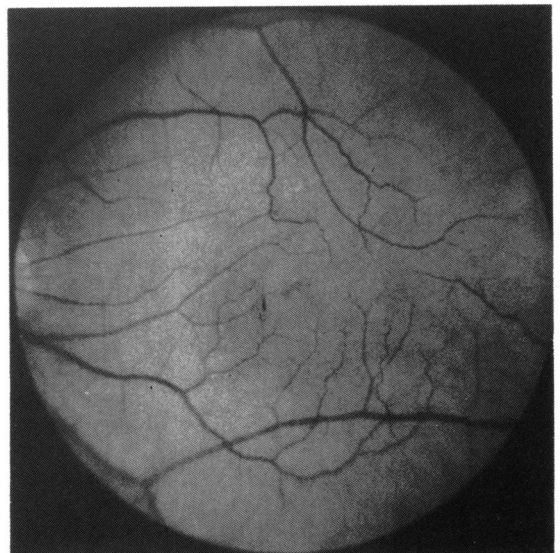


Fig. 2B

**Fig. 2** (A, right eye; B, left eye): *Late stage of solar retinopathy showing diffuse pigmentary change in the perifoveal area, and a central 'hole-like' area.*

Three weeks after the initial injury the patient's visual acuity had returned to 6/6 in both eyes. She still complained of bilateral central scotomata, confirmed on Amsler grid testing. Funduscopy revealed slight pigmentary change at both foveas. Fluorescein angiography gave normal results.

#### CASE 4

A 33-year-old woman presented to the RVEE Hospital in July 1987. She complained of a black spot in front of her right eye. In May 1987 she had been on a pilgrimage to Medjugorje. She had stared at the sun at 7.00 pm intermittently for a few minutes. While she was so doing, the sun had danced and changed colour from orange to black to white. When she looked away she noticed her vision was blurred, and there was a black spot in front of her right eye. Gradually with time her vision improved, but the black spot has persisted.

On examination her visual acuity was 6/9 in the right eye and 6/12 in the left eye. The left eye had been convergent and amblyopic since childhood. The findings on slit-lamp examination were normal. Colour vision and Goldmann fields were normal. Amsler grid testing of the right eye showed a central and two small paracentral scotomata. The left fundus was normal. The right fundus showed an irregular pigmentary disturbance at the fovea and perifoveal area, surrounding a central 'hole-like' lesion.

#### Discussion

In the 1940s an entity termed foveomacular retinitis was found in large numbers of military recruits.<sup>1</sup> Abnormal findings were frequently bilateral and limited to the fovea and perifoveal area. In the acute stage there was loss of the foveal light reflex, macular oedema, and a yellow exudate. The foveal exudate resolved after 10–14 days. In the later stages a hole-like lesion at the fovea was surrounded by a perifoveal ring of coarse pigment.

The aetiology of this lesion was disputed and was attributed to localised disease of the choriocapillaris or vasomotor disturbances.<sup>2,3</sup> It is now generally accepted that the disorder was caused by sun gazing and is termed solar retinopathy.<sup>4</sup>

Eclipse watching is the commonest cause of solar retinopathy. It has also been described in sun bathers, pilots, military recruits, in cases of mental illness and drug abuse,<sup>5,7</sup> and following religious rituals. During religious rituals pilgrims may become oblivious to the ocular discomfort induced, and may stare at the sun for prolonged periods of time, incurring significant visual damage.

Solar retinopathy is usually bilateral. If there is pre-existing strabismus, damage is limited to the

dominant eye. The prognosis for solar retinopathy is variable.<sup>8</sup> If there is early improvement in visual acuity, then full recovery may be expected within four to six weeks. Recovery to 6/6, however, may be accompanied by a permanent central or paracentral scotoma.

Solar retinopathy is due to a combination of thermal and photochemical injury. A relatively large proportion of the solar energy is concentrated in the blue end of the spectrum. It is thought that solar retinopathy is caused by the photochemical effects of the short wavelengths in the visible spectrum at 400–500 nm, with some thermal enhancement from the longer wavelengths in the infrared.<sup>9</sup> Experimentally it has been shown that the sensitivity of the retina to photic damage increases with a decrease in wavelength.<sup>10</sup> The basic photochemical mechanism underlying the sensitivity of the retina to short wavelengths of visible light is unknown. Several photochemical mechanisms may be responsible for the observed damage.

The brunt of injury is borne mainly by the outer retinal layers. In the early stages there is damage to the retinal pigment epithelium, with oedema, irregular pigmentation, and frank necrosis.<sup>11</sup> In the later stages there is focal loss of rod and cone nuclei and depigmentation of the retinal pigment epithelium.<sup>12</sup>

Spectral transmission of lenses reveals that a significant number of standard tinted lenses transmit unnecessarily high amounts of light in the ultraviolet, visible, and infrared portions of the spectrum.<sup>13</sup> These lenses offer no protection against retinal damage following direct observation of the sun. The only way to avoid solar retinopathy is to refrain from sun gazing. During an eclipse the public should be advised to view the sun indirectly using a pinhole camera.

We present here a series of four patients all of whom looked deliberately at the sun for prolonged periods of time. They were encouraged to do so by other pilgrims, who themselves had seen apparitions when staring at the sun. Two of the four patients were amblyopic in one eye, and suffered damage to the dominant eye. All four patients suffered irreversible visual damage, with persistent central scotomata.

We should ensure that the public is aware of the dangers of sun gazing—whether during religious rituals, sun bathing, or eclipse watching.

#### References

- 1 Cordes FC. A type of foveomacular retinitis observed in the US Navy. *Am J Ophthalmol* 1944; 27: 803–16.
- 2 Kerr LM, Little HL. Foveomacular retinitis. *Arch Ophthalmol* 1966; 76: 498–504.
- 3 Harrington DO. Autonomic nervous system in ocular diseases. *Am J Ophthalmol* 1946; 29: 1405.

- 4 Ewald RA, Ritchley CL. Sun gazing as the cause of foveo-macular retinitis. *Am J Ophthalmol* 1970; **70**: 491-7.
- 5 Gladstone GJ, Tasman W. Solar retinitis after minimal exposure. *Arch Ophthalmol* 1978; **96**: 1368-9.
- 6 Das T, Mirankarf MS, Chaddah MS. Solar chorioretinal burn. *Am J Ophthalmol* 1956; **41**: 1048-53.
- 7 Penner R, McNair JN. Eclipse blindness. *Am J Ophthalmol* 1966; **61**: 1452-7.
- 8 MacFaul PA. Visual prognosis after solar retinopathy. *Br J Ophthalmol* 1969; **53**: 534-41.
- 9 Ham WT, Sliney D. Retinal sensitivity to damage from short wavelength light. *Nature* 1976; **260**: 153-5.
- 10 Ham WT, Nueuer HA, Williams RC, Geeraets WJ. Ocular hazard from viewing the sun unprotected through various windows and filters. *Appl Optics* 1973; **12**: 2122-9.
- 11 Tso MOM, La Piana FQ. The human fovea after sun-gazing. *Ophthalmology* 1974; **78**: 667-78.
- 12 Gass JDM. *Stereoscopic atlas of macular diseases: diagnosis and treatment*. St Louis: Mosby, 1977: 322-5.
- 13 Borgwardt B, Fishman GA, Meulen DV. Spectral transmission of tinted lenses. *Arch Ophthalmol* 1981; **99**: 293-7.

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